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GOOD ROADS IN THE UNITED STATES.

BY

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When Washington first went to the Ohio country, before the French and Indian War, he began to see that roads must be built across the mountains to tie the West to the colonies by the sea. This interest he never lost, and it shaped his private action and public policy so long as he lived. The greatest of our early Federal statesmen took up the cause, and the first decades of the nineteenth century were marked by the planning and building of great highways. When Ohio was admitted to the Union, in 1803, the enactment was accompanied by a law setting apart the proceeds from sales of public lands in Ohio for the building of a highway. Here was the origin of the Cumberland Road, for which the first contracts were let in 1811. The stumps were to be removed for a width of four rods, the roadbed was to be thirty feet wide, and the road was to be surfaced with a heavy cover of broken stone. West of the Monongahela the maximum grade was $4\frac{1}{2}$ degrees; and in the western sections of the road, where stone was not accessible the material used was gravel. Thus by successive appropriations the great highway through Ohio, to the westward, was brought to completion and became known in pre-eminence as the National Road, although by no means the only road for which Federal money was set apart.

In 1817 Calhoun gave expression to the general sentiment when he urged that the Republic be bound together by a "perfect system of roads and canals." He would have a trunk line from Maine to Louisiana, a connection of the lakes with the Hudson

River, and would join to the western States all the great commercial centres on the Atlantic.

The cessation of this period of splendid road-building came about 1836, and is ascribed to the financial crisis of that period; but we can see another and more controlling reason. The day of railways had dawned, and it became plain that the long hauls must be made by steam. The iron roads took the field, and absorbed the resources and ambitions of progressive men, and the dirt road, and sometimes those who traversed it, sank from view. Of what account is an earth road when a locomotive can go fast and pull enormous loads? When, by and by, the capitalist could go swiftly and in comfort from New York to Chicago, and the member of Congress could draw his mileage and be whirled from San Francisco to Washington, why should they concern themselves about the country roads? Were they not as good as they had ever been? And why, after all, should a farmer, who gets his pace behind a plough, wish to go faster? Thus the dirt road became more dusty in summer and more deep in winter for seventy-five years. Nobody seemed to appreciate the fact that a million and a half of miles of dirt roads crossed the land everywhere, and that more millions of men and beasts must daily use them. The State of Iowa has a hundred thousand miles of these roads, and she spent upon them every year between two and three millions of dollars, but under a worn-out or rather an always bad plan that gave her little to show for it but mud of finer grain and greater depth. To-day this great State has adopted a money system in place of the old plan of loafing out a road tax under the direction of incompetent pathmasters.

This new understanding of our vast road problem began to show itself about twenty years ago, and the interest has so risen that good earth roads in America are but a question of time. The farmer is beginning to know that he is the factor of first industrial importance, and the capitalist and the statesman are also finding that whatever helps agriculture helps the town and city and blesses every citizen. The farmer, at least in the States of the east, has seen toilsome and even profitless years in recent times. Keep the farm up as he might by increasing toil, he has seen the selling value of his land go steadily down, and he has dragged his loads of produce to an indifferent market, in vain competition with the great farmer of the prairies, and has seen himself distanced in the acquirement of a competence by the tradesmen and skilled mechanics of the towns.

How far the decline in value of what he owns, or is trying to

own, is due to bad roads and expensive hauling he does not know, but he is beginning to suspect that good roads would go far to bring back to him a reasonable prosperity. The net shrinkage in the value of the farmer's property in the Empire State from 1890 to 1900 was more than \$69,000,000. Thoughtful men have again and again urged that this shrinkage is largely due to bad roads, and the present writer has seen no attempt to dispute this claim. It is what Professor J. A. Holmes, the champion of good roads in North Carolina, calls the "mud, sand and hill tax." This covers the case for North Carolina, with her mountains, her Piedmont, and her coastal plain. In New York we should shorten it to mud and hill tax; for we have our share of sticky soil, and the pioneers arranged that a road should rarely go around a hill when it was possible to go up a hill and down again. In Illinois it is enough to drop all the rest and call it mud tax, pure and simple. Shall we see what it is? Professor Holmes places the amount of it in his State at \$10,000,000 per year, or, as a good roads convention orator put it, it is the same as if the farmers of North Carolina should each year kill every horse and mule in the State and buy new with clean cash; or, one-tenth of the waste would give a seven months term to every school in the State.

The highway experts of Maryland make the very moderate estimate that bad roads in this State handicap their people to the extent of \$3,000,000 annually. It costs about one billion dollars to haul the farm products of the United States to market each year. Of this vast sum \$600,000,000 are wasted on account of bad roads.

Much attention has been given to the relative cost of the several modes of transporting freight. The unit chosen for comparison is the ton-mile—that is, the cost of carrying one ton of produce, of an average sort, a distance of one mile. Basing their conclusion on correspondence with 10,000 farmers, the Office of Public Road Inquiries puts the cost per ton-mile on dirt roads at 25 cents. On the railway the figure is $\frac{3}{4}$ of one cent, or less. By water the rate varies between $\frac{1}{4}$ and $\frac{1}{12}$ of a cent. As compared with the ocean rate we are informed that for the canal we must multiply by 5; for rail, by 15; and when we come to the wagon on the country road we must take 500 for our multiplier.

The cost per ton-mile on the New York Central Railway in 1869 was $2\frac{4}{10}$ cents. In 1893 the cost had gone down to $7\frac{1}{10}$ of a cent. But where has been any reduction of the cost of the farmer's preliminary haul, except when, in recent years, improved roads have been built? How much has he been helped as he has jolted

to market over the sods and cobblestones thrown into the middle of the roads by the pathmasters? In a good roads convention held in Raleigh in 1902 it was said without contradiction that it was as cheap to take freight from California to the eastern seaboard as to bring produce from farms fifteen miles away into Raleigh.

Through the consular offices of the United States it has been possible to learn the cost of highway transportation in European countries. About Leeds, in Yorkshire, a two-horse team makes a ten-mile trip, going and returning, in a day, and pulls about $2\frac{1}{4}$ tons, making six trips each week, at a cost of \$2.40 a trip. About Sheffield the rate is 8 to 12 cents per ton-mile. In Germany the ton-mile varies, but is everywhere low; about Frankfort it is equivalent to 10 cents in hauls of 12 miles. In the district of Hanover, for ten-mile distances the rate is $4\frac{1}{6}$ cents, and about Munich 5 to 7 cents.

In Switzerland, Canton of St. Gall, a double team draws 30 to 40 hundredweight on hilly roads and 50 to 60 hundredweight on level roads. In France, commercial agency of Roubaix, the cost per ton-mile is a little under 12 cents.

We need not wonder, then, at the expenditure by England and Wales of \$20,000,000 annually upon their roads; nor can we count it other than the highest economy that France expends each year \$37,500,000 for the same purpose.

The average cost per ton-mile of freight carriage upon good roads of broken stone is about 8 cents, which, taken with figures already given, proclaims to the farmer that if he can get a good road he will save seventeen cents every time he draws a ton of wood, wheat, or potatoes a distance of one mile. Upon the improved roads of New Jersey one team hauls four to five tons, as against a bad-road load of one ton. At \$3.00 per day for man and team this means a saving of \$9.00 to \$12.00 for a ten-mile haul of such an amount of freight. The estimate of saving for the State of New York falls into line with those of Maryland and North Carolina, the figure being \$7,000,000 to \$10,000,000 per year. Good roads would enable some comparatively long-distance hauling to be made by team—an important consideration in case of perishable produce and household furniture, where much deterioration could be saved by avoiding railway transit. Thus on the good roads of Belgium wagons carry freight 60 to 70 miles, between Liège and Brussels or Antwerp.

The elements of loss arising from bad roads are many. We

must count in the time of men and draft-animals; the extra number of such animals employed where much teaming is required; the exposure and extra hardship to which men and beasts are subject; and the heavy strain and effective destruction of finish by which vehicles and harnesses are affected. The farmer is also restricted in the times in which he can go to market. If high prices happen to coincide with deep mud, he cannot avail himself of the golden moment. A Maryland farmer reports that he could not have marketed his wheat the previous season, from February to April, if the price had been \$2.00 a bushel. Another lost his whole crop of corn because he could not carry it to a proper place of storage. In France it is customary to use the cold or stormy days for hauling to market. But the American farmer must use for hauling the very days that are most valuable for work on the farm. No words can set forth all the elements or bring out all the meaning of the "mud tax."

It is unquestioned that good roads bring marked appreciation in the value of farm lands. In Union County, New Jersey, it is affirmed that the rise in values has more than equalled the cost of the roads. Similar improvement of conditions in parts of Indiana gives \$6.48 per acre as the rise of the selling price of farm lands. Much higher estimates have been given for some places, as \$20 to \$30 per acre about Canandaigua, N. Y. In brief, if a farm neighbourhood is reached by a good road, a heavy tax is lifted from each bushel of produce, and the region itself becomes a desirable place to live, and prospective buyers are as willing to pay for these benefits as for rich soils, heavy timber, good fences, and unfailing springs of water.

Moreover, the farmers are often able to receive a daily paper regularly through free delivery, and they thus get prompt information of the state of the market, and are not left to tardy rumour or the representations of commission agents.

Good roads bring large gains, which cannot be reckoned in money. As the older States have become great and the people have gathered in cities, enjoying the conveniences of urban life, life in the country has seemed isolated and barren. The rural regions have been in some measure depopulated in favour of the towns and great cities. The first factor in checking the rush from the country on the part of youth and progressive spirits must be the good road.

The county in which the writer lives has but three or four municipalities which exceed or approximate a population of 2,000. The

total population of the county in 1890 was 40,545. From 1890 to 1900 the loss was 2,347. The lands of the county are fairly adapted to agriculture and the building of comfortable homes, and even the more remote are within 40 miles of cities. In seeking the cause of this inability of a fertile region to hold its own in the number of its people, we cannot go far wrong if we turn to the heavy grades, deep muds, ruts, and stones of the dirt roads. Twenty-two counties of the Empire State show a loss of 30,266 in that decade, or more than 3½ per cent. of their total population. This decline is true of some rural counties near the city of New York, and bad roads seem to be at least an important reason why the "commuters" have shunned the otherwise accessible parts of the home State in favour of the adjacent sections of New Jersey and Connecticut.

If the farmer and his wife, or particularly his sons and daughters, can finish their toilsome day and easily visit their neighbours three miles away in the evening, or enjoy the opportunities of the town, they will think better of rural life, and cease to rob the farm of its more intelligent and more ambitious men and women. In no way is the separateness of country life more relieved by good roads than by regulating attendance upon schools. In not a few road conventions the schoolmaster has borne strong testimony to the improvement in education that must result from good roads. It means regular attendance of thousands of youth, and it also is the indispensable preliminary to the consolidation of rural schools. This means better-paid and better-qualified teachers, better equipment, the pride and momentum of numbers—indeed, all the elements that unite in a school of power. No less will religion and morals be favoured and social life advanced where church attendance is not checked by every storm and the habit of making Sunday a higher and separate day thus destroyed. The duties of citizenship will be better performed, and no longer will a rainy election day prevent a reasonably full expression of the political convictions of the rural voter. And he will be far more sure to have convictions which are worth recording in a ballot, for with good roads will come, in the end, the daily paper, the telephone, the habit of alert thinking, and prompt and forcible action. It is not claimed that good roads alone will reform society, but that they count large in the chain of forces that is lifting country life to higher conditions.

There is yet another factor which tells both in point of money and of social life. The city as well as the country is rightly coming to be taxed for the rural road. The city man and the city family find that they must seek the country, for short visits, for

long vacations, or for permanent suburban homes. No rural region can attract the urban man and his money which compels him to walk or drive his horse or propel his automobile through seas of mud. For a long period the Swiss Government lost money upon the diligences which carried passengers over its post roads. Whether this is still true the writer does not know. At any rate it made no difference with the official policy, for what the public treasury lost the private pockets of the Swiss people gained many times over from the spendings of tourists. This increased their resources, increased their ability to pay taxes, and the Government was, after all, no loser by its policy.

Such are some of the reasons why our roads should be made roads indeed rather than toilsome trails of sand and mud; and in view of the facts, which are simple and easy to understand, it almost surpasses belief that a progressive people should have ignored their opportunities for almost a hundred years. In 1893 a law was enacted which again made the National Government a promoter of improved highways. By this law the Office of Public Road Inquiries was created as a part of the Department of Agriculture. It was not established to become an actual maker of roads, but rather as a medium for information, advice, and supervision. The office gathers data from all sources, home and foreign, reviews and disseminates a knowledge of important features of State legislation, and studies the method and cost of construction. It maintains a laboratory in Washington, in which road materials are subjected to physical and chemical tests, and any locality can have samples of home materials thus examined without cost. While the Office does not engage formally in road-making, it has, for education, built short sections of object-lesson roads in 22 States, but always on the invitation of local authorities. It has thus become a kind of clearing-house for our national interest in roads, not failing to reach out in every open direction to quicken interest and impart technical knowledge. It has received only modest appropriations from the national treasury, beginning with \$8,000 per year, rising to \$30,000 in 1902, and to \$35,000 as the grant of the next succeeding Congress. It has published a series of bulletins and circulars, which are made freely available to all who can make good use of them.

The policy of Federal aid has strong advocates both in and out of Congress, and this sentiment has crystallized in the well-known Latimer-Brownlow Bill, which is now in the hands of the Senate Committee on Agriculture, and which, it is expected, will be reported favourably in December, 1904. It is strongly favoured by the

Grange and by many road organizations, and provides for a proportionate division of \$24,000,000 among the States, to be expended at the rate of \$8,000,000 per year for three years. In order to enjoy this aid each State must duplicate the sum to be received from the Government. It seems to be well claimed that this is as proper a use of Government money as the improvement of rivers and harbours, the aid of railways, or the building of roadways through the national parks.

Among the powerful agencies is the National Good Roads Association, having its headquarters at St. Louis. This grew out of a number of preliminary movements, and was finally organized in Chicago in 1900, when delegates were gathered representing thirty-one States. Many great conventions have been held, the good roads trains have been organized, the Association has worked in close relation with the Office of Public Road Inquiries on the one hand and the American people on the other, and it has thus come to represent largely the sentiment and will of the people. Many large conventions—as at Ormond-Daytona, Florida, and at New Orleans—have been held during the past twelve months. A committee of the Association secured, through President McKinley, the first presentation of this subject in Congress since the early days of the last century.

Many interests have given the good roads movement momentum. Perhaps the wide adoption of the bicycle ten or fifteen years ago did more than anything else to agitate and to bring about action. Every man who used a wheel became, without planning it and before he was aware of it, an advocate of good roads. Then first did he know how bad the roads had been. The League of American Wheelmen, with its branches in every State, organized and directed to the same end the sentiments of its tens of thousands of members. Of late the automobile has been wielding a similar power. The costly breakdowns of expensive machines and the delays and discomforts of people bent upon pleasure have created more appreciation of good country roads than any amount of indoor advocacy.

More powerful than these factors, when we reckon in the coming years, appears to be the Rural Free Delivery of Mails. The growth of this department of national postal work has been prodigious. In 1896 Congress voted a paltry \$10,000 for it. But it gave opportunity to test the new proposition. The country dwellers took hold of it. Slow in some things they may be, but they have not been slow in this. Now many millions of dollars are freely

voted, and the new service reaches daily several millions of our citizens. It is no longer an experiment. It means more money for postage, more letters written, more papers taken, swifter intelligence of friends or business—in fact, almost a revolution in the conditions of country life. But the Post Office Department is exacting. It will not send its carriers through sloughs of mud or along rough and stony roads or tearing through unopened masses of snow. There must be a road, reasonably good, and there must be bridges, passable in all seasons, and as readily after prolonged storms as in the finest weather. Tens of thousands of dollars have been spent on the highways at the direct instance of the Post Office Department. As long ago as 1902 one hundred fords had been bridged in the State of Texas for this reason; old roads had been improved and new lines of road created. In the western division of rural service one-fourth of all the routes favourably reported were to have improved roads as a result of the new enterprise. In several Southern States applications have been rejected because the roads were impracticable for a regular and comfortable service. In some cases it has been necessary to threaten discontinuance of the delivery service unless the roads were improved, and results have been forthcoming. Thus public policy and private interest conspire to the great end.

The railways have abiding reasons for wanting good country roads. Every railway line offers a channel of outflow for the products of a belt of farm lands on either side. These lands have access to the iron roads by the common highway. If the farmer can reach the market at the railway station from distances limited to eight to ten miles, the railway taps a belt of country sixteen to twenty miles wide: double the distance for the haul that can be made with a profit remaining, and the belt becomes thirty to forty miles wide. The farmer will plant more acres, ship more bulky produce, have more money, order more goods by express, take more railway journeys—in short, the railway serves a rich region instead of a poor one.

Officials of the Mobile and Ohio Railroad state that in February, 1898, their receipts were 65 per cent. lower than for the same month in 1897, and 80 per cent. lower than in February, 1896, on account of severe weather and bad country roads. The opinion is held that, with good roads, many railways could dispense with one-third of their rolling stock, because of the regularity in receiving freight throughout the year, and because it would usually be possible to haul loaded cars in both directions.

Great lines of railway have shown their interest in practical and substantial ways, and most conspicuously by bearing the expense of sending good roads trains over their lines and maintaining them for several months at a time. With these trains will be found experts from the Office of Public Road Inquiries, officials of the National Good Roads Association and of the railways themselves. They carry an outfit of road-making machinery, which is sent for free use by manufacturing concerns which appreciate the gains of so good an opportunity to exhibit their wares. It has been suggested that cement-makers be invited to take part and show what they can do in making sample culverts and bridges. The train visits localities in succession, stopping at each for several days. The locality furnishes the material and feeds and lodges the workmen. A considerable fraction of a mile of object-lesson road usually results from the visit. At the same time a convention is commonly held, which has often been heralded by emphatic messages from the Governors of States, and is addressed by members of legislatures and of the National Congress, by road experts, local road officials, by teachers, farmers, and progressive men of many occupations. The National Good Roads Convention held in St. Louis in April, 1903, was addressed by Senators from Tennessee and South Carolina, by General Nelson A. Miles, and President Jesse of the University of Missouri, by Hon. Wm. J. Bryan, by the Governors of Texas and Iowa, and by the President of the United States. This meeting was not held in connection with the migration of a good roads train, but is fairly representative of the breadth and strong interest of many such conventions.

About four years ago the President of the National Good Roads Association asked the Illinois Central Railway to send out a train at a cost of \$40,000 to \$50,000. The president of the railway said: "That is a large amount to throw in the mud, but we will consider it." They considered it and they did it, and the result was a chain of road conventions and sample roads from Chicago to New Orleans, uniting in a great industrial and social enterprise the men of North and South. Trains have since been sent out by the Lake Shore, Great Northern, Southern, and other railways. The train of the Southern Railway system left Alexandria, Virginia, October 29, 1901, and was at work, the Christmas holidays excepted, until the following April. Nearly fifteen miles of road were built, in six States, and eighteen conventions were held, of which five were State conventions. When we observe that the Alabama conventions were held and sample roads built at Birming-

ham, Montgomery, and Mobile, while in Virginia the chosen points were Danville, Lynchburg, Charlottesville, and Richmond, we sufficiently show the influence likely to be exerted over the whole of these great States.

The possibility of employing convict labour has been a considerable factor in road development, especially in the Southern States. In those States, in the year 1900, 4,377 convicts were employed in building public highways. It is urged that during the same period 7,000 men were confined in county jails in that part of the Union who might better have been building highways for the use and advantage of citizens than living in idleness at a heavy cost to the public.

Professor Holmes, speaking for North Carolina, says that experience has been favourable to this system of convict employment, both in its efficiency and in respect of the health of the man. Certain inducements were offered, such as a reward or a shortening of terms, for those who were faithful. After trial of a year no attempts to escape had been made, and the prisoners had been kept at a less cost than when in ordinary confinement. Prisoners guilty of murder, rape, and arson were made an exception in the matter of road service, and were held behind prison walls.

The road law of Delaware, passed in 1893, provides for the purchase of a quarry where stone shall be broken for roads by convict labour. The general policy is opposed by the Prison Association of New York because of interference with free labour, danger of escapes, and the demoralization through much publicity both of the prisoners and the people at large. On the other hand, it is urged that able-bodied men are rewarded for crime by being supported in idleness and that factory labour in prisons is indeed hostile to free labour. The out-of-door exercise is good for the men, and the sight of them is claimed rather to be a deterrent from crime. It is urged that in the South the transfer from a system of contracts made with irresponsible and often cruel private parties to the humane care of public authorities would be a kindness to the convicted criminal. The middle ground is also taken that machinery will largely do away with hand labour in actual road-making; hence it is proposed to concentrate convicts at quarries, in the preparation of materials to be shipped by railways under permanent contracts, to the points where the material is needed. This would involve the erection of prison buildings at such locations of quarries.

Warden Grimes, of New Jersey, favours the use of convicts, and

thinks it will stop the labour agitation against prison manufactures. He also affirms that the condition of the men has improved under the system. In California, by a law of 1895, it was decided to employ convicts in public work which, on account of its cost, would not otherwise be undertaken. A rock-crushing plant was put in at Folsom, where the material for roads is good, and this material has been sold at prices of 25 to 30 cents per ton, and this at a profit to the State. The Southern Pacific Railway Company conceded low transportation, the rate being about three-fourths of a cent per mile. This plan has promoted road-building in Stockton, Marysville, Sacramento, and other towns. In South Carolina prison vans have been used, enabling prisoners to camp where the work is done, thus reducing the cost of maintenance.

Massachusetts was one of the first States to adopt the plan of State aid and to place its roads under the control of a highway commission, one of whose three members must be a competent engineer. State aid was voted in 1892, and the eleventh annual report, of date 1904, has now appeared. These reports are valuable records of methods and progress. The State has 17,000 miles of public roads. State highways 482 miles in extent were completed by the close of 1903. The gravel roads have been built at a cost of \$1,500 to \$2,000 per mile, and the macadam roads have cost \$8,000 per mile; 646 petitions for roads have been received, contemplating the location and building of 1,663 miles of highway. The State pays three-fourths, the counties one-fourth, and maintenance is by the State.

An important law, known as the "small town" act, was passed in 1900. Since that time 255 petitions have come from 101 towns. The work consists of cutting hills to good grades, filling, and draining. The greatest gain is in the fact that this work is planned and directed by experts, but is carried out by local road officials, who thus get a most important training. "After five years of trial it can be positively stated that there is a marked improvement of the country roads throughout the Commonwealth, and that this improvement is entirely due to the so-called small town act."

New York has for several years been among the more progressive States in the improvement of highways. Under the leadership of State Engineer Edward A. Bond, Mr. William Pierrepont White of Utica and others public sentiment has been widely aroused and the needed legislation has been secured. The larger amount of State aid has been granted under what is known as the

Higbie-Armstrong Law. It is proposed to build a system of main roads, amounting to ten per cent. of all the common roads in the State. The extent of this undertaking is seen when it is understood that there are 74,097 miles of earth roads in total. The Governors of the State took up the road interests in their messages in 1890 and following years, and in 1896 and 1897 the farmers gave the subject attention in institutes held in many counties. It is computed that good roads will save \$10,000,000 per year in the preliminary haul of produce. Under the Higbie-Armstrong Act the State pays one-half the cost of improvement, the county thirty-five per cent., and the town fifteen per cent. The Legislature of 1902 appropriated \$795,000, and the amount set apart for the current year (1904) rose to \$1,108,265. This item is under the Higbie-Armstrong Act, and further appropriations for road-work bring the total for 1904 to \$1,500,000. As a result nearly 500 miles of main road will have been finished by the close of this year, and the counties have provided their share for 767 miles more, which will be built as soon as State funds are available. A large convention of the supervisors of towns from most of the counties is annually held in Albany; and the sentiment of the people is thus organized and brought to bear on the legislative and the executive authorities. There is a strong movement to raise \$50,000,000 by bonding, that the benefits of the ten per cent. of trunk roads may not be lost to the present generation. It is urged with much force that this is as reasonable as to raise \$100,000,000 by this means for the Erie Canal when a large proportion of the farmers are in no way benefited by that waterway.

Under the old plan 2,000,000 days of labour were supposed to be expended on the roads each year, an outlay purporting to amount to \$3,000,000. There was little but mud and dust to show for this, and yet for many years these conditions aroused surprisingly little criticism. The law for the benefit of main roads has now been supplemented by the Fuller Law, by which the counties may adopt a money system and receive fifty per cent. of State aid for the improvement of the side-lines of road, thus giving the rural residents everywhere an equitable share of improvements. This in its results is somewhat like the small town act in Massachusetts, and 358 towns in New York have taken advantage of it during the year 1904. Hon. Martin Dodge, director of the office of Public Road Inquiries, affirmed in April, 1903, that in New York more permanent improvements in the highways had been made in two years under State-aid laws than had been made in two hundred

years before. The State Supervisors, also, are in favour of the system of county engineers, of the adoption of a wide-tire law, and of the enactment of the Brownlow Bill by the National Government.

The work is in an advanced state in New Jersey, where, in 1901, 1,000 miles of road had been built under the State-aid plan. The construction of stone roads began in 1891, and State aid was voted in 1893. It is said that 100 to 125 baskets of produce now make an ordinary load where before 25 baskets formed the average; and it is believed that the sum of \$27,000,000 has been added to agricultural values in the State.

There has been a great awakening in the South, as has been hinted in our notice of the good roads train of the Southern Railway. No State has been more active in these improvements than North Carolina. Mecklenburg County is one of the progressive centres of the work, and this single county had in 1901 one hundred miles of stone road, and five to ten miles of new road were being added each year. The interested reader is referred to a vivacious account of the road movement about Charlotte, in this county, in an address by Captain S. B. Alexander, found in Bulletin 24, Office of Public Road Inquiries.

Reference has been made to work in a few of the older States, but the reader is not to suppose that the new interest in roads is circumscribed or local. It is as nearly non-sectional, non-political, and universal as any movement in recent years. Pennsylvania has set apart \$6,500,000 to be expended upon her roads during the next six years. Illinois has appointed a good roads commission, with a view to amending the road laws. Alabama is among the more progressive Southern States in providing for special taxes and permitting the issue of bonds. The reader will find a review of recent road legislation in 26 States in the year-book of the Department of Agriculture for 1903 and in recent publications of the National Good Roads Association.

Few economic and social problems are so important as this, and in few is the way so fully open for solution in the immediate future. Nearly every region has suitable road materials, as at Mobile, where the people of the Southern Railway Good Roads Train built a sample road of oyster-shells covered with gravel. The Office of Public Road Inquiries often finds that materials are brought from a distance through ignorance of those which, as good or better, lie unused but near at hand.

The present waste is inexcusable in view of present experience.

The millions now sunk in mud-holes can swiftly, by new methods, be turned into profitable channels. Not every county pathmaster can receive an engineer's training, but the principal highways can be constructed by engineers, and the less-used feeders can receive oversight, as in Massachusetts and as contemplated by the county engineer system in New York. The technical requirements will be met and the money will be at hand when the majority of the rural people know a good road and demand its advantages. If the technical schools which we have cannot provide the necessary training, we may develop somewhere in this country a school similar to the French National School of Bridges and Highways.

Mr. D. R. Francis, of the Louisiana Purchase Exposition, recalls the time when the courts had to compel abutting property to pay paving assessments in cities; and he urges that to raise \$3,000,000 a year in Missouri would only require a tax of 25 cents on each \$100, which would probably add \$5 per acre to the land values of the State. The burden should fall, as it is falling, upon city and country alike, for every citizen harvests the blessings of improved highways.

With road-building will go a good measure of re-location in all regions of much relief, correcting, so far as possible, the mistakes of the pioneers. A recent survey has shown that a road can be carried up the rugged slopes of Grandfather Mountain in the Appalachians of North Carolina with a maximum grade of 5 per cent. The "hill tax" of Professor Holmes will be reduced as the farmer and tourist are lifted out of the slough and sent on their way rejoicing. Not much longer will the careless farmer or manufacturer be allowed to plough the roads, old or new, when a wide tire becomes a road-maker rather than a road-wrecker. It is no new idea; for the wide-tired wheel was urged by Albert Gallatin in the road-making days of long ago, and effective enactments are sure to follow the building of costly roads. If America be the most progressive nation in the world, her citizens will not much longer endure medieval discomforts when they go out to mingle with their fellows and market the fruits of their fields.